

# Cryptology ePrint Archive: Report 2011/639

## Towards a Probabilistic Complexity-theoretic Modeling of Biological Cyanide Poisoning as Service Attack in Self-organizing Networks

*Jiejun Kong, Dapeng Wu, Xiaoyan Hong, Mario Gerla*

**Abstract:** We draw an analogy of *biological cyanide poisoning* to security attacks in self-organizing mobile ad hoc networks. When a circulatory system is treated as an enclosed network space, a hemoglobin is treated as a mobile node, and a hemoglobin binding with cyanide ion is treated as a compromised node (which cannot bind with oxygen to furnish its oxygen-transport function), we show how cyanide poisoning can reduce the probability of oxygen/message delivery to a rigorously defined "negligible" quantity. Like formal cryptography, security problem in our network-centric model is defined on the complexity-theoretic concept of "negligible", which is asymptotically sub-polynomial with respect to a pre-defined system parameter  $x$ . Intuitively, the parameter  $x$  is the key length  $n$  in formal cryptography, but is changed to the network scale, or the number of network nodes  $N$ , in our model. We use the  $\text{RP}(\frac{1}{n})$  complexity class with a virtual oracle to formally model the cyanide poisoning phenomenon and similar network threats. This new analytic approach leads to a new view of biological threats from the perspective of network security and complexity theoretic study.

**Category / Keywords:** foundations / biochemical science based on complexity theory

**Date:** received 25 Nov 2011

**Contact author:** jiejunkong at yahoo com

**Available formats:** [Postscript \(PS\)](#) | [Compressed Postscript \(PS.GZ\)](#) | [PDF](#) | [BibTeX Citation](#)

**Version:** 20111129:220737 ([All versions of this report](#))

**Discussion forum:** [Show discussion](#) | [Start new discussion](#)

---

[ [Cryptology ePrint archive](#) ]